

PATENT ABSTRACTS OF JAPAN

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(54) GLOSSY PAPER FOR INK JET RECORDING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a recording medium which shows an improved image quality, especially an upgraded image density when printed, an improved dot roughness and the better uniformity of a feeling of gloss on the surface of an ink receiving layer, and also has an image quality and a feeling of uniform gloss equivalent to a medium manufactured of a photographic paper base material or a film base material, in a glossy paper for ink jet recording by a casting process.

SOLUTION: This glossy paper for ink jet recording is a cast coated paper with a highly glossy coating layer formed on one or both faces of a base material. The coating layer contains a pigment and an adhesive, with a coagulating agent which coagulates with the adhesive, contained in the surface of the coating layer. The adhesive contains either of a polyvinyl alcohol or a polyvinyl acetal or both and the coagulating agent contains a boron compound, a colloidal silica and a resin.

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CLAIMS

[Claim(s)]

[Claim 1] It is glossy paper for ink jet record which carries out coagulant content and is characterized by the thing which the coating layer formed in one side or both sides of a base material is cast coated paper which has strong gloss, and this coating layer contains a pigment and adhesives, and can solidify with these adhesives on this coating layer front face, and for which these adhesives contained either [either / both or] polyvinyl alcohol and a polyvinyl acetal, and said coagulant contained a boron compound, colloidal silica, and resin.

[Claim 2] Said colloidal silica is glossy paper for ink jet record according to claim 1 characterized by being un-spherical colloidal silica.

[Claim 3] Said boron compound is glossy paper for ink jet record according to claim 1 or 2 characterized by being borax.

[Claim 4] Said resin is glossy paper for ink jet record according to claim 1, 2, or 3 characterized by choosing one or more sorts from a starch, casein, cellulosic, acrylic, polyurethane, polyester, vinyl acetate, ethylene-vinyl acetate, and styrene-butadiene copolymer, and combining.

[Claim 5] Said pigment is glossy paper for ink jet record according to claim 1, 2, 3, or 4 characterized by containing an alumina.

[Claim 6] Said pigment is glossy paper for ink jet record according to claim 1, 2, 3, or 4 characterized by containing a silica with a mean particle diameter of 1 micrometer or less.

[Claim 7] Said base material is glossy paper for ink jet record according to claim 1, 2, 3, 4, 5, or 6 characterized by being paper.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention has the high gloss of a printing side about the glossy paper for ink jet record, and it is related with the high record form of the printing grace near photograph image quality.

[0002]

[Description of the Prior Art] An ink jet recording method is a method which records by forming a dot by making the drop of ink adhere in discharge and the record paper. In recent years, high record of a quality of printed character is being attained by the technical progress of an ink jet printer, ink, and a record medium.

[0003] As an element for which an ink jet record medium is asked, it is raised that absorption of ** ink and desiccation are quick, that ** printing concentration is high, that there is neither breadth of ** dot nor a blot of the shape of a mustache, etc. If a general regular paper also has the size nature more than fixed, a blot can also expect few of a certain amount of qualities of printed character.

[0004] When asking for a on the other hand more high quality of printed character, the medium of the dedication which prepared the ink absorbing layer which has fitness to the ink of an ink jet printer on a medium on [various] the base material is used. Many things which prepared the resin coating layer which does not contain the pigment coating layer or pigment which uses a pigment and a binder as a principal component by using paper and a film as a base material as a medium only for these ink jet records in the front face are used.

[0005] The medium only for ink jets is further classified into a mat tone medium and a gloss medium from a surface state. When requiring near image quality by the film photo, the latter gloss medium is used. It is raised that the perfect circle nature of ** dot is high in addition to the property described above as a property required of these gloss medium, and the feeling of gloss of that that image repeatability is good, ** water resisting property, and lightfastness are good, ** image field, and a blank paper part is high etc.

[0006] Although various kinds of approaches are proposed in order to maintain the property of ** - **, maintaining the ink absorptivity of **, and drying as a process of a gloss medium, the general approaches are the approach of forming an ink absorbing layer by the cast method, and giving gloss to a front face, and the approach of forming an ink absorbing layer on the base material for printing paper. Generally, although the ink absorptivity of ** tends to control the former compared with the latter, it is inferior compared with the latter in the dot perfect circle nature of **, image repeatability, the image field of **, the feeling of gloss of a blank paper part, and grace. Since the film layer of polyethylene is formed on the base material of paper, when an ink absorbing layer is formed in the front face like RC paper (resin coat paper) generally, since the film plane is smooth, the ink absorbing layer front face of the base material for printing paper is also smooth, and a glossy front face tends to form it. However, in order to raise ink absorptivity, it is necessary to make [many] the amount of coating and, and since the base material itself is more expensive than paper, the whole cost will become high compared with the gloss medium by the former cast method. Moreover, since it is a compound material when discarding, there is also a problem that recycle does not hear.

[0007] the glossy paper for ink jet record by the cast method -- this point -- although it is advantageous, there is a problem in said quality side carried out, and in order to solve these technical problems, various kinds of proposals are made. There is a proposal that surface smooth nature is high by specifying the average of roughness height on the front face of a recording layer, glossiness, and the air permeability of the detail paper to JP,6-72017,A and the ink jet record form which is excellent in the high-class feeling of image quality is obtained. Moreover, there is a proposal that the ink jet record form which has the feeling of gloss which was excellent by specifying the magnitude and the number of a crack of a recording layer front face to JP,11-348416,A, and ink receptiveness is obtained, and when there are too few cracks, there is also a trouble whose feeling of gloss increases that ink absorptivity falls on the other hand. Anyway, in the glossy paper for ink jet record manufactured by the cast method, it is the present condition which the

image quality exceeding the medium manufactured using the printing paper base material or the film base material and the record medium which has a uniform feeling of gloss do not have.

[0008]

[Problem(s) to be Solved by the Invention] The purpose of this invention is offering the image quality which is equal to the medium which has improved the improvement in image concentration when the image quality which is the trouble of the above-mentioned conventional technique improved especially prints and improvement in dot perfect-circle nature, and the homogeneity of the feeling of gloss on the front face of an ink absorbing layer, and was manufactured using the printing-paper base material or the film base material, and the record medium which has a uniform feeling of gloss in the glossy paper for ink-jet record by the cast method. In order to solve these technical problems, when this invention person etc. determined the surface state of the glossy paper for ink jet record in the case of manufacturing by the cast method, he found out that close relation was between the feeling homogeneity of gloss on the improvement in the coagulant and image concentration and improvement in dot perfect circle nature, and the front face of an ink absorbing layer paying attention to important coagulation processing.

[0009] It is that un-spherical colloidal silica is used especially for the 2nd purpose as colloidal silica at this invention, and is offering the glossy paper for ink jet record with still higher ink absorptivity.

[0010] The 3rd purpose of this invention is offering the glossy paper for ink jet record which performed coagulation processing enough by using borax as a boron compound, formed the front face without a crack, and made still better the homogeneity of a feeling of gloss, the perfect circle nature of a dot, and image clear nature.

[0011] The 4th purpose of this invention is using what chose from the starch, casein, cellulosic, acrylic, polyurethane, polyester, vinyl acetate, ethylene-vinyl acetate, and styrene-butadiene copolymer one or more sorts, and was combined as resin, and is offering the glossy paper for ink jet record equipped with omission prevention of colloidal silica, ink absorptivity, and glossiness.

[0012] The 5th purpose of this invention is offering the glossy paper for ink jet record which lessens the crack of an ink absorbing layer extremely, and secures glossiness, and has ink rate of absorption moderately making an alumina contain as a pigment, or by making a silica with a mean particle diameter of 1 micrometer or less contain as a pigment.

[0013] It is using paper as a base material, and compared with the printing paper base material which has a film layer, the manufacturing cost of the 6th purpose of this invention is also low, and when discarding, it is being able to recycle and using a resource effectively.

[0014]

[Means for Solving the Problem]

[0015] The glossy paper for ink jet record of this invention is cast coated paper with which the coating layer formed in one side or both sides of a base material has strong gloss, and this coating layer contains a pigment and adhesives, and it is characterized by these adhesives and the thing which can solidify and for which coagulant content was carried out, these adhesives contained either [either / both or] polyvinyl alcohol and a polyvinyl acetal, and said coagulant contained a boron compound, colloidal silica, and

resin on this coating layer front face.

[0016] As for colloidal silica, in the glossy paper for ink jet record of this invention, it is desirable that it is un-spherical colloidal silica.

[0017] As for a boron compound, in the glossy paper for ink jet record of this invention, it is still more desirable that it is borax.

[0018] Moreover, as for resin, in the glossy paper for ink jet record of this invention, it is desirable to choose one or more sorts from a starch, casein, cellulosic, acrylic, polyurethane, polyester, vinyl acetate, ethylene-vinyl acetate, and styrene-butadiene copolymer, and to combine.

[0019] As for a pigment, in the glossy paper for ink jet record of this invention, it is desirable to contain an alumina.

[0020] Moreover, as for a pigment, in the glossy paper for ink jet record of this invention, it is desirable to contain a silica with a mean particle diameter of 1 micrometer or less.

[0021] As for a base material, in the glossy paper for ink jet record of this invention, it is still more desirable that it is paper.

[0022]

[Embodiment of the Invention] This invention is explained to a detail below. In this invention, after applying the coating liquid which has a pigment and a binder, while coagulation processing of the spreading side is carried out using a coagulant and a coating side is in a damp or wet condition, it is stuck to the metal side of mirror plane finishing which had this coating layer heated by pressure, and cast coated paper is manufactured. Let a boron compound, colloidal silica, and resin be indispensable components as a coagulant by this invention at this time. In this invention, coagulation processing influences greatly the surface state of the paper which carried out the cast coat. A crack will be formed in a coating layer front face, in case it is stuck to the metal side of mirror plane finishing heated as coagulation is inadequate by pressure and moisture evaporates. The homogeneity of a feeling of gloss and the perfect circle nature of a dot will be spoiled by this crack initiation. As a result, a printing image will become indistinct, and grace will be reduced.

[0023] if coagulation comes out enough and there is on the other hand -- the crack of a coating layer front face -- extremely -- decreasing -- a crack -- there is nothing -- or the front face which is not almost can be formed. By such a front face being formed, the homogeneity of a feeling of gloss and the perfect circle nature of a dot can obtain a good and clear printing image.

[0024] In coagulation processing, it is important to select what is solidified on the binder component and effectiveness target of a coating layer, and since polyvinyl alcohol and a polyvinyl acetal, or its either is contained as a binder in coating liquid, a boron compound is desirable as what is solidified on these binders and an effectiveness target. Orthoboric acid, metaboric acid, borate, etc. can be used as a boron compound which is one of the indispensable components of a coagulant. Specifically, H_3BO_3 , $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$, $\text{K}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$, KBO_2 , $\text{NH}_4\text{B}_4\text{O}_9 \cdot 3\text{H}_2\text{O}$, NH_4BO_2 , $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, calcium $2\text{B}_6\text{O}_{11} \cdot 7\text{H}_2\text{O}$, etc. can be illustrated.

[0025] In coagulation processing, it is desirable that a coagulant is high concentration as much as possible from a viewpoint which performs coagulation processing effectively, and since sodium tetraborate (borax) can obtain a high-concentration water solution also in these and coagulation processing can be performed effectively, it is the most desirable

boron compound. Although not limited especially, it is desirable especially in coagulation processing to make it 2% or more of concentration as a water solution.

[0026] Furthermore, colloidal silica is contained as an indispensable component as a coagulant. There are an alkaline type and an acid type of colloidal silica, and although it is both usable, it is necessary to use properly with pH of the water solution of a boron compound.

[0027] Since pH of a borax water solution is 9-9.5 when using borax as a boron compound, it is desirable to use the colloidal silica of an alkaline type. As particle shape of colloidal silica, spherical colloidal silica and un-spherical colloidal silica can be used. Un-spherical colloidal silica is the number of specification [spherical colloidal silica], a serial, or colloidal silica in the condition of having branched in part and having been connected. A feeling of gloss is easy to be obtained so that spherical colloidal silica of particle diameter is small, but since ink absorptivity may fall, as mean particle diameter, 1nm - 100nm is suitable in respect of a feeling of gloss, and ink absorptivity. Moreover, since ink absorptivity is inferior since an opening decreases so that particle diameter is small as un-spherical colloidal silica, an opening will become large too much if particle diameter is too large, and the fall of image concentration may be caused, as a particle size, 30nm - 200nm is desirable. In order for un-spherical colloidal silica to tend to form opening structure, it excels in ink absorptivity, and about the ease of coming out of gloss, the more nearly spherical one is rather excellent. Therefore, selecting suitably according to the purpose is important, and it is also possible to mix and use both.

[0028] The resin contained in a coagulant is used for the purpose which prevents improvement in surface reinforcement, and omission of said colloidal silica. Therefore, be [what is necessary / just although this purpose is suited], it is required for coincidence to be stable to a boron compound. As such a thing, oxidization starch, etherification starch, a carboxymethyl cellulose, Cellulosics, such as hydroxyethyl cellulose, casein, gelatin, Soybean protein, polyethylene imide system resin, polyacrylic acid, or its copolymer, A maleic-anhydride copolymer, acrylamide system resin, acrylic ester system resin, Polyamide system resin, polyurethane system resin, polyester system resin, an alkyd resin, Epoxy system resin, epichlorohydrin system resin, a urea-resin, melamine resin, A styrene-butadiene copolymer, a methyl methacrylate-butadiene copolymer, the resin of vinyl system polymer latexes, such as acrylic polymer latexes, such as a polymer of acrylic ester and methacrylic acid ester or a copolymer, vinyl acetate, and an ethylene-vinylacetate copolymer, is illustrated, and independent -- or it is used together and used. It is desirable that surface reinforcement, omission prevention of colloidal silica, ink absorptivity, and glossiness are one or more sorts chosen from a starch, casein, cellulosic, acrylic, polyurethane, polyester, vinyl acetate, ethylene-vinyl acetate, and styrene-butadiene copolymer as a good thing also in these.

[0029] as the addition of resin -- the colloidal silica 100 weight section -- receiving -- the 1 - 100 weight section -- it is 3 - 50 weight section more preferably. If the colloidal silica omission prevention effectiveness is inadequate if there are few additions than 1 weight section, and it increases more than the 100 weight sections, the fall of ink absorptivity will be caused.

[0030] As for the coagulant of this invention, not only a coagulation operation of the coating layer which is the original purpose but the colloidal silica used as an indispensable component is distributed over the maximum front face, and raises the

printing fitness of a good feeling of gloss, and an ink jet. Therefore, if a certain amount of coating weight is required for the coagulant coating weight to a coating layer and there is little coating weight, the purpose of this invention will not be attained. For this reason, as for the boron compound which is the component which makes a coating layer solidify as an amount of coagulants, it is desirable to apply so that colloidal silica may serve as coating weight of two or more [0.05g //m] by solid weight further two or more [0.1g //m] with solid weight. Since much coagulant coating weight is not what checks the effectiveness of this invention even if there is, there is especially no upper limit of coating weight, but since coagulation liquid has a possibility of a desiccation load being applied and causing an operable fall when there is much coating weight since it is a low-concentration water solution, it is desirable to consider as two or less 10 g/m by the solid weight of a boron compound and the sum total of colloidal silica. If the coating weight of a coagulant is in the proper range, required sufficient coagulation operation and the improvement operation in printing fitness can be acquired.

[0031] The coating which forms the ink absorbing layer of this invention contains an ink fixing agent and a release agent a pigment, a binder, and if needed. The pigment used by this invention can use white pigments, such as precipitated calcium carbonate, a magnesium carbonate, a kaolin, a barium sulfate, aluminum silicate, a magnesium silicate, synthetic amorphous silica, colloidal silica, wet and a dry type silica sol, an alumina, a colloidal alumina, a zeolite, diatomaceous earth, and a magnesium hydroxide, as an inorganic pigment. In this invention, since there are extremely few cracks of an ink absorbing layer, if an alumina is used when ink rate of absorption falls, a desirable result will be obtained. As an example of an alumina, gamma-alumina, delta alumina, eta alumina, theta alumina, and a water alumina are mentioned. The particle size of an inorganic pigment is 1 micrometer or less as it is large, and it is 0.01-0.5 micrometers preferably. Since ink absorptivity will be too good and ink will enter into an acceptance layer deep part if it exceeds 1 micrometer, the depth of shade falls remarkably, and in 0.01 micrometers or less, ink absorptivity worsens at the same time a crack becomes easy to go into an ink absorbing layer front face. Furthermore, the above-mentioned effectiveness same with adding an alumina because the pigment of this invention makes the silica with a mean particle diameter of 1 micrometer or less other than an alumina contain is acquired. [0032] In addition, it is also possible to use together with an inorganic pigment and to add an organic pigment.

[0033] The binder of an ink absorbing layer used by this invention Polyvinyl alcohol, A polyvinyl acetal, oxidization starch, etherification starch, a carboxymethyl cellulose, Hydroxyethyl cellulose, casein, gelatin, soybean protein, Polyethylene imide system resin, polyvinyl PIROHI drine compounds system resin, polyacrylic acid, or its copolymer, A maleic-anhydride copolymer, acrylamide system resin, acrylic ester system resin, Polyamide system resin, polyurethane system resin, polyester system resin, polyvinyl-butyril system resin, An alkyd resin, epoxy system resin, epichlorohydrin system resin, a urea-resin, Melamine resin, a styrene-butadiene copolymer, a methyl methacrylate-butadiene copolymer, the resin of vinyl system polymer latexes, such as acrylic polymer latexes, such as a polymer of acrylic ester and methacrylic acid ester or a copolymer, and an ethylene-vinylacetate copolymer, is illustrated, and independent -- or it is used together and used. Especially desirable binders are polyvinyl alcohol and a polyvinyl acetal, are used together with independent [these] or the above-mentioned

resin, and are used. The amount of the binder used is determined in consideration of the printing fitness of a record medium, the reinforcement of an ink absorbing layer, and coating acidity or alkalinity. Usually, it is preferably added one to 200% of the weight to pigment weight in about 5 - 100% of the weight of the range.

[0034] In this invention, it is desirable to add a cationic polymer in addition to the above, a pigment, and binders. Since it reacts as an operation of a cationic polymer with the anion component in the color currently used into ink and an insoluble salt is formed in water, ink is fixed and a water resisting property improves. As such a cationic polymer, polyethyleneimine, epichlorohydrin denaturation poly alkylamine, Polyamine polyamide epichlorohydrin, dimethylamine ammonia epichlorohydrin, Polyvinylbenzyl trimethyl ammonium halide, PORIJ acrylic dimethylannmonium halide, A poly dimethylaminoethyl methacrylate hydrochloride, polyvinyl pilus JIUMU halide, Cationic polyacrylamide, a cationic polystyrene copolymer, A diaryl dimethylannmonium chloride polymerization object, a diaryl dimethylannmonium chloride sulfur-dioxide copolymerization object, A diaryl dimethylannmonium chloride amide copolymerization object, dicyandiamide formaldehyde polycondensation, A dicyandiamide diethylenetriamine polycondensation object, the poly allylamine, The poly allylamine hydrochloride, polyacrylamide system resin, a polyamide epoxy resin, melamine resin acid colloid, urea system resin, the cation denaturation PVA, an amino acid mold amphoteric surface active agent, a betaine mold compound, other quarternary ammonium salt, polyamine, etc. are used. An addition is used in 1 - 50% of the weight of the range to total binder weight. Especially the desirable addition range is 5 - 30 % of the weight.

[0035] As other additives, a defoaming agent, lubricant, a dispersant, a wetting agent, etc. can be used if needed.

[0036] A coater with the Ayr knife, a roll coater, a bar coating machine, a comma coating machine, a blade coating machine, etc. well-known as a coating method of the coating which forms the ink absorbing layer of this invention is used. the amount of coating -- solid content conversion -- 5 - 40 g/m² -- the range of 7 - 30 g/m² is preferably desirable. If the amount of coating exceeds 40 g/m², a crack tends to go into an ink absorbing layer front face, and when there are few amounts of coating than 5 g/m², it will be hard to form sufficient glossy surface.

[0037] After the glossy surface formation in this invention carries out coating of the coating by the above-mentioned coating machine, it is performed by giving coagulation liquid to a coating side, making a coating solidify, and sticking a front face to a cast drum by pressure. In case this process forms the high ink absorbing layer of ink absorptivity ability that there are few surface cracks of this invention, it is an important process.

Although it is as having described above about the coagulant to be used, an ink absorbing layer front face with more few surface cracks can be formed by adjusting time amount until it gives a coagulant in addition and reaches a cast drum, cast drum temperature, the pressure at the time of being stuck by pressure, and line speed. It is necessary to rationalize about these terms and conditions by searching for optimum conditions according to the facility and coating to be used.

[0038] As a base material used by this invention, paper bases, such as the usual paper of fine quality, a report grade paper, and a white board, are used. Use of ECF pulp with few [in consideration of the case where it is recycled as a fuel] chlorine contents as raw material pulp, or TCE pulp is desirable. In order to press down too much osmosis of the

coating at the time of a cast coat, it is desirable to use the stencil paper which carried out coating of the water soluble polymers, such as starch and polyvinyl alcohol, by size press. [0039] Moreover, the under coat which consists of a pigment and adhesives can be prepared on a base material, and the cast coat layer of this invention can also be prepared on this.

[0040]

[Example] Although an example is given and this invention is explained further in full detail hereafter, this invention is not limited to these examples. Moreover, especially the "section" and "%" shown in an example, unless it shows clearly, solid weight section and solid weight % is shown.

[0041] (Example 1) The coating of 14 % of the weight of solid content which consists of the cationic polymer (PAPIOGEN P-105: product made from SENKA) 10 weight section as a binder to the dispersion liquid (100 weight sections as solid content) of the alumina (Aluminum Oxide C: trade name made from Japanese AEROJIRU) which is the primary particle size of 13nm as a pigment as the polyvinyl alcohol (PVA117: Kuraray Make) 20 weight section and an ink fixing agent was prepared. Borax / un-spherical colloidal silica (Snow tex PS-M: product made from Nissan Chemistry) / casein was dissolved in water by the ratio of 3/1/0.15 with solid weight as a coagulant, and coagulation liquid of 5% of solid content concentration was adjusted. After having applied the above-mentioned coating to the paper of fine quality of basis-weight 160 g/m² which carried out surface treatment by oxidized starch so that it might become by the roll coater at amount of coating 15 g/m², having applied the coagulant subsequently so that it might become 1.5 g/m² by solid weight, and performing coagulation processing, while the obtained coating layer front face was in the damp or wet condition, it was stuck to the cast drum with a skin temperature of 100 degrees C by pressure, and the glossy paper for ink jet record was created.

[0042] (Example 2) In the example 1, by making the casein of a coagulant into phosphoric ester-ized starch (MS4600: product made from Japanese Food), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0043] (Example 3) In the example 1, by making the casein of a coagulant into methyl cellulose (METOROZU 90SH-100: product made from Shin-etsu Chemistry), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0044] (Example 4) In the example 1, by making the casein of a coagulant into polyurethane (ADEKABON titer HUX232: product made from Asahi Electrification), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0045] (Example 5) In the example 4, by making the casein of a coagulant into vinyl acetate (MOBINIRU 206: product made from Clariant Polymer), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0046] (Example 6) In the example 1, by using the casein of a coagulant as denaturation polyester resin (CW-11: product made from Country Coloring matter), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0047] (Example 7) In the example 1, by making the casein of a coagulant into ethylene-vinyl acetate (polysol EVA AD-6: Showa High Polymer Co., Ltd. make), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0048] (Example 8) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having made borax / spherical colloidal silica compound acrylic resin (MOBINIRU 8050: product made from Clariant Polymer) into 3/2 as a coagulant in the example 1.

[0049] (Example 9) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having set borax / un-spherical colloidal silica (Snow tex PS-M: product made from Nissan Chemistry) / spherical colloidal silica compound acrylic resin (MOBINIRU 8050: product made from Clariant Polymer) to 3/0.9/0.2 as a coagulant in the example 1.

[0050] (Example 10) In the example 1, by using the casein of a coagulant as a styrene-butadiene copolymer (L-1970: Asahi Chemical Co., Ltd. make), coagulation liquid was adjusted and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0051] (Example 11) The binder was made into the polyvinyl acetal (S lek KX-1: Sekisui Chemical Co., Ltd. make) in the example 1, the same coagulant as an example 1 was adjusted, and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0052] (Example 12) The binder was made into the polyvinyl alcohol 10 weight section and the polyvinyl-acetal 10 weight section in the example 1, the same coagulant as an example 1 was adjusted, and the glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied.

[0053] (Example 13) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having used the synthetic silica (silo jet 703C: Grace Japan, Inc.) with a mean particle diameter of 0.3 micrometers instead of the alumina as a pigment in the example 1.

[0054] (Example 1 of a comparison) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having applied without using a coagulant in an example 1.

[0055] (Example 2 of a comparison) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having made the coagulant only into borax and having applied it in the example 1.

[0056] (Example 3 of a comparison) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having not used the borax of a coagulant in the example 1.

[0057] (Example 4 of a comparison) The glossy paper for ink jet record was created the condition as indicated in the example 1 except having not used the casein of a coagulant in the example 1.

[0058] (Example 5 of a comparison) The glossy paper for ink jet record was created the condition as indicated in the example 3 except having not used the colloidal silica of a coagulant in the example 3.

[0059] The following evaluations were carried out about the above-mentioned glossy paper for ink jet record, and the result was shown in Table 1.

[Table 1]

The criteria of the evaluation result of Table 1 were performed as follows.

[0060] The image clear nature ISO standard image (ISO/JIS-SCID highly-minute color digital standard image data, the name: portrait of an image, the identification number of an image: N1) was printed using the Seiko Epson ink jet printer "PM-770C." Viewing estimated the printed image.

O : a record image is very clear and contrast has clarified.

O : a record image is clear and contrast has clarified.

** : Although the record image was clear, contrast did not clarify, and the color sinks.

x : A record image is indistinct and the color sinks.

[0061] Solid (100% concentration) one of CMYK and RGB and an alphabetic character were printed using the ink jet printer "PM-770C" by blot Seiko Epson. Viewing estimated the boundary of each color of the solid section, and grade ** of a blot of an alphabetic character.

O : a boundary carries out distinctly, there is no blot, and an alphabetic character is clear.

O : a blot of a boundary is not conspicuous and an alphabetic character is clear.

** : A blot of a boundary is conspicuous, an alphabetic character is indistinct and there is a problem practically.

x : It becomes impossible to distinguish an alphabetic character and practically improper [a blot of a boundary is severe, and].

[0062] The halftone (10% concentration) was printed using the ink jet printer "PM-770C" by dot configuration Seiko Epson. Subsequently, with the optical microscope, the printing part was expanded by 200 times, and was observed, and the perfect circle nature of the crack condition of a coating layer front face and a dot configuration was evaluated.

O : there is no crack in a front face and the perfect circle nature of a dot configuration is very high.

O : a surface crack is not conspicuous and the perfect circle nature of a dot configuration is high.

** : A surface crack is conspicuous and the perfect circle nature of a dot configuration is low.

x : A surface crack is severely conspicuous and the configuration of a dot is an indeterminate form.

[0063] To the homogeneous glossy paper front face of a feeling of gloss, from the longitudinal direction, the surface state was observed with the naked eye, and a feeling of gloss was judged.

O : the feeling of gloss of a blank paper is high, and homogeneity is good.

** : The feeling of gloss of a blank paper is a little low.

x : The feeling of gloss of a blank paper is low, and homogeneity is bad.

[0064] (5) Using the surface on-the-strength Gakushin-type fastness test machine (product made from Circuit tester Industry), the front face was rubbed 5 times on conditions without a dead weight, and extent of surface reinforcement (getting damaged powder omission) was judged by viewing.

O : it is [neither a blemish nor powder omission] and is good.

O : neither a blemish nor powder omission is conspicuous, and it is good.

** : A blemish and powder omission are conspicuous and there is a problem practically.

x : A blemish and powder omission are severely conspicuous and practically improper.

[0065]

[Effect of the Invention] By invention according to claim 1, the glossy paper for ink jet record was able to give the homogeneity of the very good feeling of surface gloss on the image quality which is equal to the medium manufactured using the printing paper base material or the film base material, and the front face of an ink absorbing layer, and the dot perfect circle nature at the time of printing, though it was glossy paper for ink jet record manufactured by the cast method. Moreover, the color-enhancing improvement by the formation of image high concentration when image quality improved especially prints was realizable. [0066] By invention according to claim 2, the glossy paper for ink jet record with still higher ink absorptivity was able to be offered by using un-spherical colloidal silica especially as colloidal silica.

[0067] Invention according to claim 3 was able to perform coagulation processing enough by using borax as a boron compound, the front face without a crack was able to be formed, and the glossy paper for ink jet record which made still better the homogeneity of a feeling of gloss, the perfect circle nature of a dot, and image clear nature was able to be offered.

[0068] The glossy paper for ink jet record equipped with omission prevention of colloidal silica, ink absorptivity, and glossiness was able to be offered by using what chose from the starch, casein, cellulosic, acrylic, polyurethane, polyester, vinyl acetate, ethylene-vinyl acetate, and styrene-butadiene copolymer one or more sorts, and was combined as resin by invention according to claim 4.

[0069] The glossy paper for ink jet record which is made to contain an alumina as a pigment, or is made to contain a silica with a mean particle diameter of 1 micrometer or less as a pigment, lessens the crack of an ink absorbing layer extremely, and secures glossiness, and has ink rate of absorption moderately by invention according to claim 5 or 6 was able to be offered.

[0070] By using paper as a base material, compared with the printing paper base material which has a film layer, the manufacturing cost was also low, by invention according to claim 7, when discarding, it could recycle and the resource was able to be used effectively.